

A new approach to a final examination in surgery

Use of the objective structured clinical examination

A Cuschieri MD ChM FRCS(Eng) FRCS(Ed)

F A Gleeson MRCP

R M Harden MD FRCPGlas

R A B Wood FRCS

University Department of Surgery and Centre for Medical Education, Ninewells Hospital and Medical School, Dundee

Summary

In an attempt to overcome the disadvantages of the conventional final examination an objective structured clinical examination (OSCE) was introduced into the final examination in surgery at the University of Dundee. In this approach the components of clinical competence are tested at 20 stations through which the candidates rotate. At some stations the students are assessed, by an examiner using a check list, on their ability to take a history or examine a patient. At other stations objective questions are used to assess the students' findings and their interpretation, his (or her) management of the patient, and his assessment of laboratory investigations. This approach to the final examination is more reliable and more valid than traditional methods and has practical advantages over them.

Introduction

Disquiet has been expressed concerning serious weaknesses in the traditional clinical examination as an assessment of a student's competence^{1,2}. Lack of objectivity and varying standards on the part of the examiners and problems as to what is being tested in the examination are some of the difficulties. The traditional examination tests only a small sample of clinical competence and does not adequately test history-taking ability³. Indeed, far from being a test of clinical skills, the examination is often conducted as an assessment of the candidate's factual knowledge.

While many innovations and improvements have been introduced in the form of written examinations, little has been done with regard to clinical assessments. Harden *et al*⁴ have de-

scribed the use of an objective structured clinical examination (OSCE) designed to assess a student's clinical competence. In this approach students rotate round a series of stations and at each station a component of competence is tested. At some stations—procedure stations—the student is asked to take a history, examine a patient, test a urine sample, or interpret an X-ray, ward charts, or laboratory report, usually accompanied by a summary of the patient's history. The procedure station may be followed by a question station at which the student answers multiple choice questions (MCQs) relating to the findings, their interpretation, and patient management. At the procedure stations examiners record the students' performance on check lists which have been agreed and prepared before the examination. This type of examination has been used in Dundee for several years for in-course assessments and, encouraged by the experience gained, the Department of Surgery decided to introduce it as an integral part of the final examination in surgery in June 1977. This paper reports what happened.

Timetable for the examination

In previous years the final examination in surgery was conducted over a period of 4 days, approximately a quarter of the students being examined on each day. On this occasion all 101 students were examined on one day. In the morning the students sat an objective structured clinical examination and in the afternoon they were examined on a traditional long case. Borderline and merit students had an oral examination. The timetable is summarised in Table I.

TABLE I *Timetable of examination*

Hours	
0830	First group of students assemble for OSCE and are briefed.
0900	First diet of OSCE commenced.
1015	Second group of students assemble.
1024	First diet of OSCE completed.
1040	Second diet of OSCE commenced.
1204	Second diet of OSCE completed.
1245-1415	Students start long cases.
1345-1515	Students examined on long cases.
1620-1720	Oral examinations for selected students.
1730	Examiners' meeting.

The OSCE was run concurrently in each of three surgical units, one-third of the students being examined in two diets in each unit. The second group of students assembled for briefing just before the first groups completed their examination. The OSCE lasted 80 minutes, students spending 4 minutes at each of 20 stations.

In the long case each student was examined by a pair of examiners for 20 minutes after he (or she) had spent 45 minutes taking a history and examining a patient.

OSCE

The OSCE comprised 20 stations, and these are summarised in Table II. In addition to general surgery the following specialties were included in the examination—orthopaedics, neurosurgery, plastic surgery, otolaryngology, ophthalmology, radiology, and laboratory medicine.

Three stations tested history-taking ability and were followed by stations at which MCQs were asked relating to the previous station. At five stations examiners assessed methods of physical examination and four were followed by stations at which MCQs were asked relating to the previous station; at one station MCQs were asked as part of the station. One station assessed information gained from in-

TABLE II *OSCE stations in surgery final examination*

Station	Topic	Assessment
1	History of patient with indigestion	Examiner's check list
2	Questions relating to Station 1	15 MCQ items
3	History of patient with rectal bleeding	Examiner's check list
4	Questions relating to Station 3	15 MCQ items
5	Examination of patient's neck	Examiner's check list
6	Questions relating to Station 5	15 MCQ items
7	History of patient with knee complaint	Examiner's check list
8	Questions relating to Station 7	15 MCQ items
9	Examination of patient's inguinal region	Examiner's check list
10	Questions relating to Station 9	15 MCQ items
11	Inspection of temperature chart of patient with abscess formation postoperatively	10 MCQ items
12 (a)	Haematology report on anaemic patient on whom surgery planned	5 MCQ items relating to patient's management
(b)	Biochemical report on liver function tests	5 MCQ items relating to patient's management
13	Examination of patient's legs (neurosurgery) Examination of patient's face (plastic surgery)	Examiner's check list
14	Questions relating to Station 13	10 MCQ items
15	Examination of deaf patient	Examiner's check list
16	Examination of patient with ulnar neuritis	Examiner's check list
17	Questions relating to Station 16	15 MCQ items
18	Examination of 3 X-rays	15 MCQ items relating to X-rays
19	Examination of 3 photographs of patients	15 MCQ items relating to photographs
20	Examination of 2 fundi shown on stereoscopic viewers	10 MCQ items relating to fundal appearances

STATION 3

STUDENT'S NAME AND INITIALS

A. KEY POINTS IN THE HISTORY

Please put a tick in the appropriate box in each line.

	Carried out satisfactorily	Attempted but not satisfactorily	Not attempted
Age			
Occupation			
Bleeding - frequency			
- past history			
- type			
- severity			
Mucus			
Slime			
Stool frequency			
Piles			
Pain			
Appetite			
Weight loss			
Family history			
Drug history			

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B. HISTORY TAKING TECHNIQUEPoints to be considered:

Establish patient's name

Dates established

Correct pace of questions

Correct phrasing of questions

Attention paid to answers

Answers followed up appropriately

Marking Scheme:

8 - 10 Distinction

7 - Very good pass

6 - Pass

5 - Bare pass

4 - Fail

3 or less

Bad fail

**C. STUDENT'S ATTITUDE TO PATIENT**Points to be considered:

Consideration of the patient's feelings

Attempts to establish a rapport
with the patientMarking Scheme:

8 - 10 Distinction

7 - Very good pass

6 - Pass

5 - Bare pass

4 - Fail

3 or less

Bad fail

FIG. 1 *Example of examiner's check list at a history-taking station.*

spection of coloured transparencies of patients and another assessed information gained from inspection of a stereoscopic slide of an optic fundus. Three stations dealt with interpretation of X-rays, laboratory reports, and ward charts.

Station 3 was an example of a station at which the student was asked to take a history from a patient and was observed by an examiner. The instruction to the student was: 'Take a history from this patient, who complains of rectal bleeding'. The examiner's check list is shown in Figure 1 and was in three parts. He had to note whether the student asked key points in the history, the student's technique in history-taking, and finally the student's relationship with the patient. For each of the key points noted on the score sheet the examiner recorded if the student elicited it satisfactorily, if he asked for it but in an unsatisfactory way, or if he made no attempt to ask for it. The second and third parts were each marked out of a possible 10 marks, and suggested criteria to be used by the examiner were noted on the score sheet.

At the examination stations the candidate was given instructions—for example, 'Examine this patient's inguinal region'—and his performance was assessed on an agreed check list as for the history. In addition the examiner was asked to assess the candidate's ability to relate to the patient and his ability to make a diagnosis.

At the question stations the MCQs were of the multiple true/false type in which a common stem is followed by five items, any number of which can be correct. Students carried with them standard answer sheets⁵ on which they recorded their answers.

Marking scheme

Following each diet of the examination the check lists were collected from the examiners and the MCQ answer sheets from the students. The students' marks for the history and examination stations and their marks in the MCQs were entered on a transfer sheet. These scores were then entered into a programmable desk calculator which computed the students' marks based on weightings which had been agreed previously—long case 50%, OSCE history-taking stations 15% (5% each), OSCE examination stations 15% (3% each), MCQ

items relating to history and examination stations 10%, and MCQ items relating to laboratory interpretation 10%.

The program was designed so that, in addition to a print-out of each student's performance at each station and his overall performance, the calculator produced a mark for the student's overall performance at the history-taking stations, at the examination stations, and on the MCQs relating to these stations and the laboratory investigation stations. These marks were available by 3.45 p.m. on the day of the examination and on this basis the examiners decided which candidates should be given an oral examination.

Results in examination

The distribution of marks in the OSCE and in the long case are shown in Figures 2 and 3. In the long case the marks ranged from 49% to 73%. Four students scored less than 50%. In the OSCE the marks ranged from 46% to 69% and 4 students scored less than 50%.

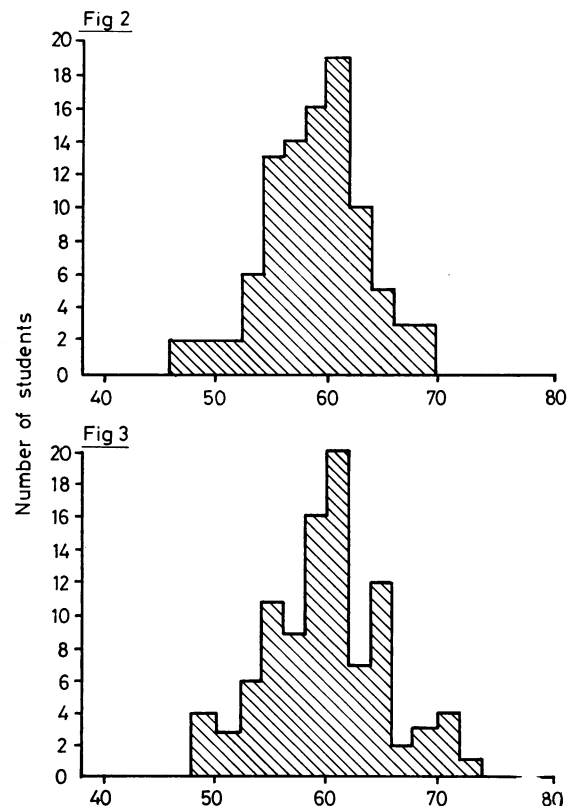


FIG. 2 Students' overall marks (%) in OSCE.

FIG. 3 Students' marks (%) in long case.

Only 1 student scored less than 50% in both sections of the examination. The students had been previously assessed clinically in six in-course assessments during their first two clinical years. Of the 3 students who scored less than 50% in the OSCE but had marks of 58%, 57%, and 65% respectively in the long case, the last 2 had been given a fail grade in at least one previous clinical examination. Of the 3 students who had failed in the long case and had marks of 56%, 59%, and 59% respectively in the OSCE, none had failed a previous clinical examination.

As a group, the students' marks in the OSCE correlated with their marks in the long case ($P < 0.02$), but some individual students showed marked variations.

In addition to an overall mark for the OSCE each student was given a mark for the history-taking stations, a mark for the physical examination stations, and a mark for interpretation of findings on history and examination and patient management and for laboratory investigation. The distribution of these marks is shown in Figures 4–7. The scores in the MCQ parts of the examination were lower

and showed a wider scatter (means \pm SD $52.1 \pm 8.69\%$ and $50.5 \pm 14.36\%$) than the scores in the history ($63.0 \pm 6.47\%$) and physical examination sections ($64.7 \pm 6.50\%$).

Students' verdict on OSCE

More than 80% of the students filled in and returned a questionnaire immediately after the examination. The major criticism expressed was that of inadequate time at the physical examination stations. The students were also critical of the ambiguous wording of some of the MCQs. With the above reservations the majority of students welcomed the OSCE and they listed the following advantages over the long case examination: wide range of knowledge and skills tested, provision of a comparable test for all students, examiner bias reduced or limited, and opportunity for feedback.

Examiners' views on OSCE

The majority of the examiners had no prior experience of a structured examination. Most approved of the basic format and acknow-

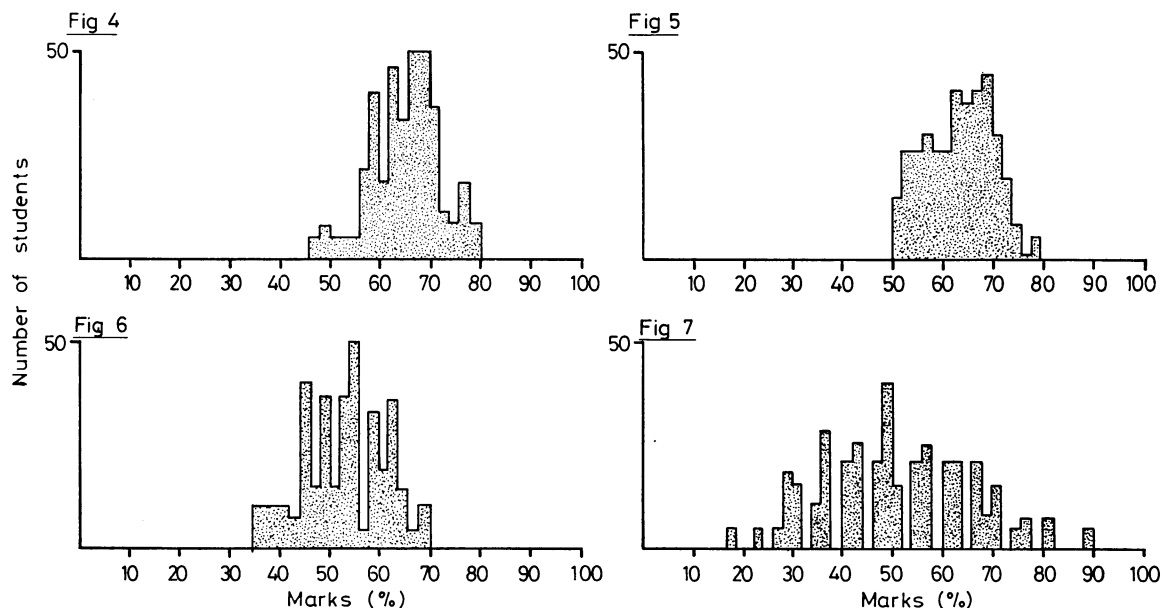


FIG. 4 Students' marks in history-taking stations in OSCE.

FIG. 5 Students' marks in physical examination stations in OSCE.

FIG. 6 Students' marks in MCQs relating to interpretation of findings in history and physical examination stations and patient management.

FIG. 7 Students' marks in MCQs relating to laboratory investigations.

ledged it as an improvement on the traditional examination. The main advantages of the OSCE expressed by the examiners included the wide range of competence tested, inclusion of minor specialties, and the efficient use of examiners' time. The majority of examiners felt that the OSCE was a more reliable examination than the traditional clinical examination, and the fact that all students examined similar patients contributed to this. The examiners were unanimous on the need for more time at the physical examination stations and several were worried about the strain imposed upon some patients who were examined by several students.

Discussion

We have found the objective structured clinical examination to be a practical feasibility in the examination of large numbers of students. Furthermore, we did not encounter serious organisational problems in its implementation as an integral part of the final clinical examination in surgery.

Favourable views on the OSCE as an assessment of clinical competence were expressed by both students and examiners involved in this exercise. The general consensus of opinion amongst all the participants was that the OSCE constituted a definite improvement on the traditional examination. In addition to the increased objectivity and wider range of skills which it can test, an advantage of the OSCE is that it can provide feedback to staff and students as to the different components of clinical competence: history-taking, physical examination, interpretation and patient management, and further investigations. Specific weaknesses in clinical competence can be ascertained and the use of the OSCE as part of a programme of in-course assessment should be of considerable benefit to the individual student.

There is no doubt that this examination demands increased preparation compared with the traditional clinical examination, but this is offset by the more efficient use of examiners'

time, and indeed the entire OSCE can be carried out in one morning as opposed to the usual 3-4-day period. The problems we have encountered in the conduct of this structured examination have been minor ones and these can be easily remedied. In general, the patients involved in this examination seemed to enjoy their experience, but a frequent change of patients at specific stations is essential.

Conclusion

The experiment of using an objective structured clinical examination in the final examination in surgery was considered to be a success and the examiners agreed to adopt this approach the following year with only minor modifications. In particular, the timing was to be adjusted so that a half-minute was allowed for students to move between stations and for examiners to complete their check lists. In addition, check lists were to be designed so that a very able student could score bonus marks, and the weighting of the various components of OSCE has been revised.

We are grateful to all the examiners who took part in the examination and to Mr R Wakeford and the staff of the Centre for Medical Education, who assisted with the computation of the students' scores. We are also indebted to our senior registrars, J Clark, A Hall, H Irving, N Longrigg, and A Johnston, who were in charge of the ward organisation of the OSCE in each of the surgical units at Ninewells Hospital and Medical School.

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